REMARKS/ARGUMENTS

Claims 1, 3–7, 9-15 and 19–23 are pending in the application.

Claims 1–6 were rejected under 35 U.S.C. 102(b) as being anticipated by Endo (US 4,532,150); Claims 1–6 were rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto et al. (US 4,711,807); claims 1–13 were rejected under 35 U.S.C. 102(b) as being anticipated by Lee (US 5,893,731).

Claims 14, 15 and 19–23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Kobayashi (US 5,550,520); claims 7 – 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Endo or Yamamoto in view of Lee (US 5,893,731); claims 14 and 19–23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Endo or Yamamoto in view of Lee and Kobyashi.

Rejection of claims 1–6 as being anticipated by Endo

The Examiner states that "Endo discloses an amorphous coating layer of silicon carbide on an electronic substrate. The substrate is subjected to a plasma atmosphere of an organosilane or polyorganosilane compounds represented by the general formula $R_{2n+2}Si_n$, where R may be a hydrogen atom and n=1-4 (monosilane or disilane when n=1 or 2). The vapor or gas of the organosilane is mixed with a vapor or gas of a hydrocarbon compound, such as methane, ethane, ethylene or toluene (col.8, 18-44)."

Applicant points out that the above citation from Endo refers to the silicon molecule of an organosilicon compound taught by Endo. Endo, col. 2, line 59-col. 3, line 7 reads as follows:

> "Typically, the organosilicon compound is exemplified by the silane or polysilane compounds represented by the general formula $R_{2n+2}Si_n$, in which R is a hydrogen atom or a monovalent hydrocarbon group selected from the class consisting of methyl, ethyl, propyl, phenyl and vinyl groups, not all of the R in a molecule being hydrogen atoms, and n is a positive integer not exceeding 4, ... " [underline added]

Endo teaches an organosilicon compound that may contain a silane or polysilane molecule, and not monosilane or disilane as a single plasma reactant. By definition an organosilicon compound contains carbon. The resulting plasma deposited film is an amorphous silicon carbide expressed by the formula Si_xC_{1-x} where x is 0.2 to 0.9, or a

composite of silicon carbide with carbon and silicon. Endo teaches that "it is sometimes advantageous according to the value of the suffix x in the formula that the vapor of the organosilicon compound [be] admixed with a vapor or gas of a hydrocarbon compounds such as methane, ethane, propane, ethylene, acetylene, banzene, toluene and the like in order to ensure deposition of the silicon carbide having a desired value of the suffix in the formula" (col. 3, 54-60). Further Endo preferably teaches keeping the substrate at an elevated temperature, namely 50 to 500 degrees Celsius, with 100 to 400 degrees Celsius preferred (col. 4; 21-26). All of Endo's process reactants and conditions are directed to producing a silicon carbide product: an organosilicon single reactant with silicon and carbon components; an optional organic component to provide additional carbon atoms for bonding with silicon in the organosilicon film; and heated substrates to enhance high temperature silicon-carbon bonding.

Applicant submits that the claimed film comprising (Si-H) and (Si-Si) fragments situated in a an organic polymer matrix is not anticipated by Endo's silicon carbide product. In the present invention the use of a separate non-carbon containing and non-oxygenated silicon donor (that is, not an organosilicon compound), and a separate non-silicon containing and non-oxygenated organic precursor, are used to produce a film product having (Si-H) and (Si-Si) fragments situated in an organic polymer matrix. Generally (Si-H) fragments are predominant when a silicon donor such as monosilane is used, and (Si-Si) fragments are predominant when a silicon donor such as disilane is used since the composition of the silicon donor primarily controls fragment formation rather than the plasma reaction. Applicant submits that claim 1 is not anticipated by Endo. Claim 2 is canceled; claims 3-4, and claim 6 are dependent from claim 1; claim 5 is dependent from claim 4. Applicant submits that claims 3-6, dependent directly or indirectly from claim 1, are not anticipated by Endo for the reasons set forth above for claim 1.

In amended claim 6, the silicon in the (Si-H) and (Si-Si) fragments is oxidized to produce a photo-oxidized dielectric. Endo does not disclose a capacitor dielectric with oxidized silicon in (Si-H) and (Si-Si) fragments. One skilled in the art would not consider photo oxidation of Endo's silicon-carbon bonded film since it is generally known that the bonding arrangement of silicon with carbon in silicon carbides does not

support oxidation of the silicon bonded atoms. Silicon carbide, in general, thermally dissociates at temperatures in thousands of degrees centigrade, whereas as silane, in general, generally thermally dissociates at a much lower range, typically in the hundreds of degrees centigrade. Comparative energy differences for photodissociation of a silicon carbide product and the claimed photosensitive film formed from a silane reactant makes Endo's silicon carbide product significantly different from the claimed photosensitive film. Further Endo teaches minimizing the presence of oxidized silicon in the silicon carbide film: "The organosilicon compound should contain no halogen or oxygen atom directly bonded to the silicon atom in the molecule since an organosilicon compound containing such a halogen or oxygen atom is poorly decomposed in the condition of the plasma discharge." (col. 2, 54-59) That is, Endo selects an organosilicon compound with no silicon oxide components as the single plasma reactant since the Endo product maximizes silicon carbide and not oxidized forms of silicon, unlike the photo-oxidized product of claim 6. Applicant submits that claim 6 is not anticipated by Endo.

Rejection of claims 1-6 as being anticipated by Yamamoto

The Examiner states that: "Yamamoto discloses an insulating material comprising a silicon compound used in various electronic fields. The insulating material is prepared by forming a film on a substrate from reactive gases by means of plasma CVD. Examples of the reactive gases are mixed gases of compounds including silicon and other gases. Examples of other gases include hydrocarbons such as CH_4, C_2H_4 and C_2H_6 (col.2, 28-66)." Yamamoto also teaches partial or complete substitution of these hydrocarbons with halogen, and ammonia, NF_3, N_2, O_2 N_2O and the like (col. 2, 66-68). Therefore Yamamoto teaches oxygenated organic precursors whereas claims 1-6 do not. Furthermore Yamamoto teaches a three component plasma reaction, namely a silicon donor, hydrocarbon (without limitation to oxygen content) and argon, to form a SiC:H:Ar product that is an insulating material.

In amended claim 1 the material of the capacitor dielectric comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix that is produced from a two component plasma reaction wherein the first component is a non-carbon containing and non-oxygenated silicon donor, and the second component is a non-silicon containing and non-oxygenated organic precursor, without argon. Applicant submits

that the capacitor dielectric of claim 1 is not anticipated by the SiC:H:Ar product disclosed in Yamamoto. Claim 2 is cancelled; claims 3-4, and claim 6 are dependent from claim 1; claim 5 is dependent from claim 4. Applicant submits that claims 3-6, dependent directly or indirectly from claim 1, are not anticipated by Yamamoto for the reasons set forth above for claim 1.

In amended claim 6 the silicon in the (Si-H) and (Si-Si) fragments is oxidized to produce a photo-oxidized dielectric. Yamamoto does not disclose a capacitor dielectric with oxidized silicon in (Si-H) and (Si-Si) fragments in the material. Applicant submits that claim 6 is not anticipated by Yamamoto.

Rejection of claims 1-13 as being anticipated by Lee

The Examiner states that "Lee teaches that conventionally a resister [capacitor] comprises a first conductor layer, a capacitor dielectric layer and a second conductor layer (col. 2, 9-15)." Lee generally discloses forming a layer of first conducting material 16 over a substrate which is patterned to form a first capacitor plate; forming a layer of capacitor dielectric material 18, such as SiO_2, over the first capacitor plate; and forming a second conductor material 20. Lee also teaches forming a dielectric comprising Ta_2O_5 by an anodization process wherein a first capacitor plate comprising Ta_2N is exposed to a $H_2C_2O_4$ solution. A second capacitor plate is formed over the Ta_2N dielectric from a layer of conducting material, such as aluminum, after patterning. In Lee's anodization process, Lee forms a capacitor dielectric with a fixed dielectric constant established by parameters of the anodization process.

In amended claim 1 the material of the capacitor dielectric comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix formed from a two-component plasma reaction in a substantially air-evacuated plasma chamber, wherein the first component of the two-component plasma reaction comprises a non-carbon containing and non-oxygenated silicon donor, and the second component of the two-component plasma reaction comprises a non-silicon containing and non-oxygenated organic precursor. Applicant submits that capacitor dielectric claim 1 is not anticipated by the Ta_2O_5 dielectric formed by chemical anodization as taught by Lee. Claim 2 is canceled; claims 3-4, and claim 6 are dependent from claim 1; claim 5 is dependent from claim 4. Applicant submits that claims 3-6, dependent directly or indirectly from claim 1,

and are not anticipated by Lee for the reasons set forth above for claim 1.

In amended claim 6 the silicon in the (Si-H) and (Si-Si) fragments in the material of the dielectric are photo-oxidized to alter the dielectric constant of the capacitor dielectric. Lee does not disclose a capacitor dielectric with oxidized silicon in (Si-H) and (Si-Si) fragments. Applicant submits that amended claim 6 is not anticipated by Lee.

In amended claim 7 the material of the capacitor dielectric includes (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix wherein the silicon is photo-oxidized. Lee does not disclose a capacitor dielectric with oxidized silicon in (Si-H) and (Si-Si) fragments. Applicant submits that amended claim 7 is not anticipated by Lee. Claims 8-10, and claims 12 and 13 are dependent from claim 7; claim 11 is dependent from claim 10. Applicant submits that claims 8-12, dependent directly or indirectly from claim 7, are not anticipated by Lee for the reasons set forth above for claim 7.

In amended claims 12 and 13 the silicon in the (Si-H) and (Si-Si) fragments in the dielectric are photo-oxidized to alter the dielectric constant of the capacitor dielectric. Lee does not disclose a capacitor dielectric with oxidized silicon in (Si-H) and (Si-Si) fragments. Applicant submits that amended claims 12 and 13 are not anticipated by Lee.

Rejection of claims 14, 15 and 19-23 as being obvious over Lee in view of Kobayashi

Lee does not disclose that capacitors are connected to inductors for use in an electric filter, or that one or more of the inductors comprise an on-chip spiral inductor. Kobayashi teaches that conventional filters typically include spiral inductors, capacitors and resistors (col.1, 30-46). Kobayashi also teaches that generally the filter structure includes capacitors C1, C2, C3 and C4 connected to spiral inductor L1 (col.3, 43-57). It would have been obvious to one of ordinary skill in the art to have the capacitor of Lee connected to a spiral inductor for use in an electrical filter because Kobayashi teaches that a conventional filter include capacitors connected to spiral inductors.

In amended claim 14, the dielectric of the one or more capacitors comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix in combination with one or more inductors to form an electrical filter. Lee and Kobayashi do not suggest alone, or in combination, a capacitor wherein the dielectric comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix in combination with one or

more inductors to form an electrical filter. Applicant submits that claim 14 is not obvious over Lee in view of Kobayashi. Claims 15, 19 and 20 are dependent upon claim 14. Applicant submits that claims 15, 19 and 20, depending directly from claim 14, are not obvious over Lee in view of Kobayashi for the reasons set forth above for claim 14.

In amended claim 21, the dielectric of the one or more capacitors comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix, with the silicon in the (Si-H) and (Si-Si) fragments oxidized to produce a photo-oxidized dielectric; the one or more capacitors with photo-oxidized dielectric are in combination with one or more inductors to form an electrical filter. Lee and Kobayashi do not suggest alone, or in combination, a capacitor wherein the dielectric comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix, with the silicon in the (Si-H) and (Si-Si) fragments oxidized to produce a photo-oxidized dielectric, in combination with one or more inductors to form an electrical filter. Claims 22 and 23 are dependent upon claim 21. Applicant submits that claims 22 and 23, depending directly from claim 21, are not anticipated by Lee in view of Kobayashi for the reasons set forth above for claim 21.

Rejection of claims 7-13 as being obvious over Endo or Yamamoto in view of Lee

The Examiner states that: "Endo and Yamamoto each teach a dielectric film on a substrate (formed from a two-component plasma reaction of a non-carbon containing and non-oxygenated silicon donor and a non-silicon containing and non-oxygenated organic precursor) for use in the manufacture of a semiconductor device. Endo and Yamamoto are silent on the specific electronic device being manufactured and do not disclose that the insulating or dielectric film is formed between conductor layers for use in a semiconductor device, such as a capacitor. Lee teaches that conventionally a resistor [capacitor] comprises a first conductor layer, a capacitor dielectric layer and a second conductor layer (col.2, 9-15). It would have been obvious to one of ordinary skill in the art to use the dielectric layer in Endo or Yamamoto between a first and a second conductor layer for use in a capacitor because Lee teaches that this is the structure of a conventional capacitor."

As discussed above Endo discloses the formation of a silicon carbide film, and Yamamoto teaches the formation of a SiC:H:Ar film. Neither Endo or Yamamoto disclose a film comprising (Si-H) and (Si-Si) fragments interstitially situated in an

organic polymer matrix, with the silicon in the (Si-H) and (Si-Si) fragments oxidized as recited in claim 7. While Lee generally teaches that conventionally a capacitor comprises a first conductor layer, a capacitor dielectric layer and a second conductor layer, neither Lee, or Endo or Yamamoto in combination with Lee suggest a capacitor with dielectric comprising (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix with the silicon in the (Si-H) and (Si-Si) fragments oxidized. Claim 8 is canceled; claims 9, 10, 12 and 13 is dependent from claim 7. Claim 11 is dependent from claim 10. Applicant submits that claims 9-13 are not obvious over Endo or Yamamoto in view of Lee for the reasons set forth above for claim 7.

Rejection of claims 14, 19-23 as being obvious over Endo or Yamamoto in view of Lee and Kobayashi

The Examiner states: "Endo and Yamamoto each teach a dielectric film on a substrate (formed from a two-component plasma reaction of a non-carbon containing and non-oxygenated silicon donor and a non-silicon containing and non-oxygenated organic precursor) for use in the manufacture of a semiconductor device. Endo and Yamamoto are silent on the specific electronic device being manufactured and do not disclose that the insulating or dielectric film is formed between conductor layers for use in a semiconductor device, such as a capacitor and that the capacitors are connected to (spiral) inductors for use in an electric filter. Lee teaches that conventionally a resistor comprises a first conductor layer, a capacitor dielectric layer and a second conductor layer (col.2, 9-15). Kobayashi teaches that conventional filters typically include spiral inductors, capacitors and resistors (col.1. 30-46). Kobayashi also teaches that generally the filter structure includes capacitors C1, C2. C3 and C4 connected to spiral inductor L1 (col.3, 43-57). It would have been obvious to one of ordinary skill in the art to use the dielectric layer in Endo or Yamamoto between a first and a second conductor layer for use in a capacitor and to connect this capacitor to spiral inductors for use in an electrical filter because Lee teaches that the structure of a conventional capacitor includes a capacitor dielectric layer between first and second conductor layers and Kobayashi teaches that capacitors are connected to spiral inductors in a conventional electrical filter."

As discussed above Endo discloses the formation of a silicon carbide film, and Yamamoto discloses the formation of a SiC:H:Ar film. Neither Endo or Yamamoto

disclose a film comprising (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix as recited in claim 14. While Lee generally teaches that conventionally a capacitor comprises a first conductor layer, a capacitor dielectric layer and a second conductor layer, and Kobayashi general teaches conventional filters comprising capacitor and inductor elements, neither Kobayashi or Lee, or Endo or Yamamoto in combination with Lee and Kobayashi suggest an electrical filter wherein the one or more capacitors have a dielectric comprising (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix. Applicant submits that claim 14 is not obvious over Endo or Yamamoto in view of Lee and Kobayashi. Claims 19 and 20 are dependent upon claim 14. Applicant submits that claims 19 and 20, depending directly from claim 14, are not obvious over Endo and Yamamoto Lee in view of Lee and Kobayashi for the reasons set forth above for claim 14.

In amended claim 21, the dielectric of the one or more capacitors comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix, with the silicon in the (Si-H) and (Si-Si) fragments oxidized to produce a photo-oxidized dielectric; the one or more capacitors with photo-oxidized dielectric are in combination with one or more inductors to form an electrical filter. Neither Lee or Kobayashi, or Endo or Yamamoto in combination with Lee and Kobayashi suggest alone, or in combination, a capacitor wherein the dielectric comprises (Si-H) and (Si-Si) fragments interstitially situated in an organic polymer matrix, with the silicon in the (Si-H) and (Si-Si) fragments oxidized to produce a photo-oxidized dielectric, in combination with one or more inductors to form an electrical filter. Applicant submits that claim 21 is not obvious over Endo or Yamamoto in view of Lee and Kobayashi. Claim 22 is dependent upon claim 21; claim 23 is dependent upon claim 22. Applicant submits that claims 22 and 23, either directly or indirectly dependent upon 21, are not obvious over Endo and Yamamoto Lee in view of Lee and Kobayashi for the reasons set forth above for claim 21.

Applicant respectfully requests reconsideration and allowance of all pending claims.

Respectfully submitted,

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